SIMPLIFIED LESSONS IN CARE OF AUTOMOBILE

Expert Frederick C. Guerrlich Describes Functions of "Bearings" or "Bushings."

HOW FRICTION IS REDUCED

How to Remedy Play of Parts When Bearings Are Worn—Problems of Many Automobile Owners Solved Readily by Man Who Knows.

AUTO LESSON NO. 110.
(Copyright, 1918, by Fred. C. Guerrlich.)

There are innumerable parts of the automobile which rub or revolve on other parts, such as the crank shaft on its supports, the crank pins in the ends of the connecting rods, the wheels on their axles. As these parts rub on one another, there will be wear and the generation of heat; or, in other words, "friction."

Friction cannot be eliminated, but it can be greatly reduced by lubrication, and by making the rubbing surfaces of materials, whose tendency to wear and heat is low, or as engineers would say, whose "co-efficient of friction is" low. Lead and bronze are such materials, the former being the better, but because of its softness, it is mixed with other metals, such as tin, antimony and copper, in which case it is known as "white" or "Babbitt" metal.

To overcome the friction, therefore, some device such as a properly shaped piece of Babbitt or bronze, or a set of rollers or rolling balls, is usually placed between the rubbing parts. These devices are called "bearings" or "bushings."

Parts can move on one another in three ways, namely, they can move in a straight line, one on the other, as, for example, the pistons in the cylinders; one can revolve in or about the other, as the crank shaft in its supports, or as the wheels on their axles, and the end of a shaft can revolve against a support.

In the automobile where the parts simply slide back and forth, as first given, the pressures and, therefore, wear, if they are well lubricated, are comparatively small, and so, as a rule, no special bearing is used.

By far the greatest amount of moving parts move as given in the second case; that is, a shaft revolves in another part, or a wheel or similar part revolves about a stationary shaft. Where the shaft is small in diameter and the movement little, the bearing is generally nothing but a "sleeve" or cylinder made of some antifriction metal, as bronze or Babbitt, and is called a "bushing;" as, for example, the wrist-pin bushings and universal-joint bushing. Where the shaft is of any size and where the movement is fast and the pressure comparatively great, the bearing is called a "journal bearing." In the engine, the journal bearings are almost always made in two parts, for the sake of easy removal, and are made of bronze or Babbitt.

The Babbitt or bronze bearings have a very low friction, but by the use of ball or roller bearings the friction and wear can be still further reduced, as when they are used there is practically no rubbing, as the balls or rollers simply roll between the two surfaces. Either ball or roller bearings are used in practically all places other than the engine.

Where the movement is as given in the third case; namely, when the end of a shaft or a flange fastened to the shaft revolves or spins on a flat surface, the bearing is said to be subjected to a thrust and the bearing is called a "thrust bearing." Thus the bearing which is placed between the clutch throw-out, or shift collar and its fork, is a thrust bearing.

Figure 1 shows one-half of a Babbitt or bronze bearing. Note the oil grooves A. It is important that these be kept cleanly cut and unobstructed, as if this is not done the oil will not be able to get to the entire bearing, but will lubricate only a thin line, one of the thickness of the oil hole.

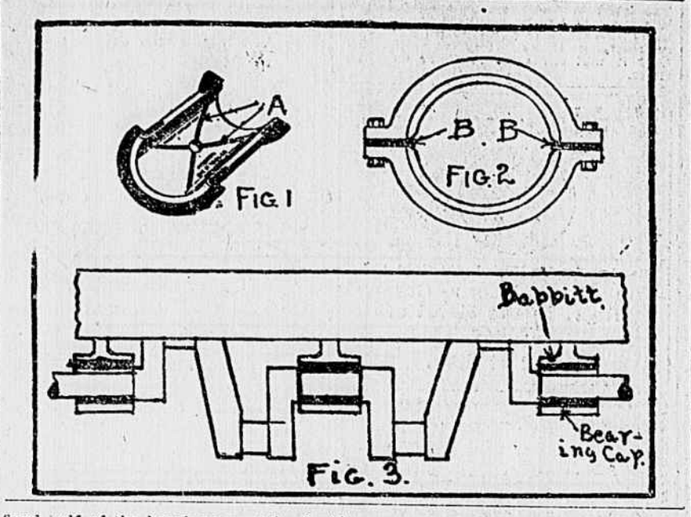
HOW TO REMEDY PLAY WHEN BEARINGS ARE WORN

When bearings of this style become worn, the resulting play can be taken out by removing or filing on the "shins," which are shown as B in Figure 2. These are separators made up of a bundle of very thin leaves of brass, or of one heavy piece. When of the former, the play is taken up by removing one of the leaves, while, if the latter, a little is filed off it. Adjusting of the engine bearings should be done by experienced mechanics only, as the bearing must fit the shaft snugly, yet not bind, while the nuts of the bolts which hold the two halves of the bearing together must be as tight as they can be without breaking.

When much play must be taken out of the bearings, or when new bearings are put in, they will have to be "scraped in." This is done by smearing some Prussian blue on the shaft, and then revolving it in its bearings. The Prussian blue will thus mark the high spots of the bearings, which high spots must then be scraped off and the process repeated, time and time again, until practically the entire surface of the bearing touches the shaft.

In fitting or scraping in bearings, care must be taken to have the shafts, etc., in line. Thus when the main bearings of a crank shaft are fitted the

Function of Bearings Shown



fixed half of the bearings must be first scraped in, and tests made repeatedly to see that no bearing is lower or higher than the others. If this is not done the bearings when tightened will tend to bend the shaft. In figure 3 I have shown the middle bearing out of line with the end bearings. Obviously, when the caps are tightened the shaft will be bent. It is for this reason that the novice should not attempt to fit the main bearings, as it takes skill and experience to do this properly.

In fitting the main bearings the half-time gears should first be studied to see if they should be brought closer together or farther apart. Failure to do this will mean a "growl" of the gears. Unfortunately, few mechanics do this, and often by taking too much from the fixed half of the bearing will bring the gears too close together.

QUESTIONS AND ANSWERS

Q. I would like to know the cause of a jerk motion on low speed on a Ford touring? F. R.

A. While a miss in the engine may be to blame, it is most likely that the low speed band is worn and slipping. An examination of the band will indicate the remedy.

Q. Three months ago I purchased a new (——) car. Several weeks afterward the car developed spark plug trouble. After every run of from twenty to fifty miles the motor missed firing. I have had the car at the service station five times but they failed to remedy the trouble. Last week they had the engine down and new rings were put in, but after fifty miles run the same old trouble developed. I had a friend take the top off the motor and we found streaks of oil on the walls of the cylinders. I am using oil of medium caliber for the motor. I tried a heavier oil, but no improvement resulted. The pistons do not seat tight, that is they can be moved slightly sidewise in all directions. The bore is three and one-quarter and stroke five and one-quarter.

The car is in other respects a fine machine. Can you suggest a remedy? O. A. T.

A. If the play of the pistons was found while they were cold then it is right that they should be so, as a certain amount of clearance must be allowed to permit of the expansion of the pistons when they become hot. I believe that the oil streaks are right also, unless oil has gathered on the piston head in any quantity. You will find that the compression will increase and the passing of oil past the rings will decrease as you run the engine and wear the rings in.

While the trouble may be due to the oil getting past the rings it is quite possible that the trouble is due to a faulty spark plug or a weak current. The interrupter points may not be correctly set, or there may be a slight short circuit or a poor connection in the primary circuit. In view of the fact that apparently all has been done that can be done to overcome oil trouble it might be well to check up the ignition system and also the compression, as regards valves.

Q. I am much interested in your articles on the automobile. I have a (——) car with (——) carbureter, and I "let it alone." I am inclosing a cut of this carburetor which has started a leak at the point marked "X." I have cleaned the carburetor as instructed but it still leaks about a pint every ten hours. Please advise how to stop the leak? P. S. McN.

A. If the leakage is only immediately after the engine has been stopped, then it probably is due to the gasoline which has condensed on the manifold flowing back. It does no harm and will probably increase with cold weather. If leakage is constant then the float may come too high. Take off the float chamber top, and turn the needle to uncrew a notch and then see if leakage stops. Try again, remembering how many turns you have given so as to get it back to original position if this does not prove the trouble. Some of these carburetors have a small tube running from the float chamber to the dash pot, which tubes sometimes split, the split being often almost imperceptible, but causing a leak.

Q. I have a 1916 (——) car which runs fairly well only when I start the engine and speed it up suddenly when it is cold it seems to choke and often stops.

A. When an engine is cold the gasoline condenses on the manifold, but the condensed gasoline will be made to flow to the cylinders by the friction of the onrushing air. Any sudden change in the carburetor, such as the sudden opening of the throttle will cause an agitation of this condensed liquid, and either cause it to run back to the carburetor, or cause too large an amount of the gas to rush to the cylinders. This will cause the choking and stopping as mentioned by you.

A. A friend of mine has a (——) car with a thing he calls a thermostat and says it makes his car run fine even when cold. What is this, and would it pay to put one on my (——) car?

A. The thermostat is a device which will expand greatly when heated. It is used in a number of cars to force the cooling water to become warm quickly when the engine is started. Its operation is as follows: When the engine and its water are cold, the thermostat, which is placed at the top of the cooling system, is contracted, and, due to its contraction, has closed a valve, which valve shuts off the water between the engine and the radiator. Thus only a small amount of water is used for cooling, but as this water becomes heated, the thermostat gradually expands and so, gradually, opens the valve between radiator and engine. Thus the engine will become warm quickly and the troubles of a cold engine are greatly lessened.

By constant opening and closing the valve, or by keeping the valve partly opened, the thermostat will keep the temperature of the water fairly uniform, which means efficiency.

They are good, but you will probably find the cost of installing one too great for the advantage gained.

MECHANICS MAKE ACES EFFECTIVE

(Continued From First Page.)

tertainments two or three nights a week.

Mechanics are needed in the air service, needed badly and at once, and all men who have had experience as motor mechanics, blacksmiths, cabinet-makers, carpenters, chauffeurs, coppersmiths, electricians, fabric workers, instrument men, magneto men, metal workers, motorcyclists, propeller makers, vulcanizers or welders will be doing their bit in the best possible way by presenting themselves for induction to the air service trade-test board at Atlanta, Ga.; St. Louis, Mo.; Detroit, Mich.; Denver, Col.; Boston, Mass.; Chicago, Ill.; New York City or San Francisco, Cal., in order that they may be inducted by these boards. The following data concerning the draft status is necessary: Address of local draft board, order and serial number, classification and division.

The "Miscellaneous For Sale" columns on the Want Ad pages offer you great opportunities to dispose of used but useful things at a good price.